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Volume 33

BOREAS HYD-8 Throughfall Data

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BOREAS HYD-8 Throughfall Data

Xuewen Wang, Richard Fernandes

Summary

The BOREAS HYD-8 team made measurements of surface hydrological processes at the SSA (1996) and NSA OBS (1994) Tower Flux sites, supporting its research into point hydrological processes and the spatial variation of these processes. These data were collected during the 1994 and 1996 field campaigns. Data collected may be useful in characterizing canopy interception, drip, throughfall, moss interception, drainage, evaporation, and capacity during the growing season at daily temporal resolution. This particular data set contains the measurements of throughfall, which is the amount of precipitation that fell through the canopy. A nested spatial sampling plan was implemented to determine spatial variations of the measured hydrological processes and ultimately the impact of these variations on modeled carbon and water budgets. These data are stored in ASCII text files.

Table of Contents

1. Data Set Overview

1.1 Data Set Identification

BOREAS HYD-08 Throughfall Data

1.2 Data Set Introduction

The BOReal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-08 team made measurements of surface hydrological processes at the Southern Study Area (SSA) (1996) and Northern Study Area (NSA) Old Black Spruce (OBS) (1994) Tower Flux sites, supporting its research into point hydrological processes and the spatial variation of these processes.

These data were collected during the 1994 and 1996 field campaigns. Data collected may be useful in characterizing canopy interception, drip, throughfall, moss interception, drainage, evaporation, and capacity during the growing season at daily temporal resolution. This particular data set contains the measurements of throughfall, which is the amount of precipitation that fell through the canopy. A

nested spatial sampling plan was implemented to determine spatial variations of the measured hydrological processes and ultimately the impact of these variations on modeled carbon and water budgets. These data are stored in American Standard Code for Information Interchange (ASCII) text files.

1.3 Objective/Purpose

The objective of these data sets was to quantify the magnitude and spatial variation of storages and fluxes of water at the moss surface and during precipitation events in selected Picea Mariana stands. The following parameters were measured to permit future parameterization of flux models: throughfall, stemflow, moss water storage, and gross precipitation. A nested spatial sampling plan was implemented to characterize the length scales of variations of the measured parameters for future use in modeling studies and for comparison with measurements at the black spruce flux towers located in the study sites, SSA-OBS and NSA-OBS.

1.4 Summary of Parameters

Precipitation that has fallen through the canopy (after storm events).

1.5 Discussion

Hydrological processes such as canopy evaporation and moss storage and evaporation may play a significant role in controlling water fluxes during the growing season in boreal wetlands. Canopy interception and moss storages and evaporation were measured using mass balance methods (throughfall catch buckets and lysimeters) to give a quantitative estimate of these processes for sparse black spruce stands. More importantly, the spatial sampling scheme allowed quantification of the expected variation of these processes within the footprint of a colocated flux measurement tower. This will allow consideration of the subtower-footprint controls on vapor fluxes that the tower is measuring. In addition, these data sets will be useful in parameterizing flux models for the site targeted as well as determining the typical variation in fine-scale processes that the models may have to account for when scaling to watershed and regional extents.

1.6 Related Data Sets

BOREAS HYD-08 1994 Gravimetric Moss Moisture Data
BOREAS HYD-08 1996 Gravimetric Moss Moisture Data
BOREAS HYD-08 Gross Precipitation Data

2. Investigator(s)

2.1 Investigator(s) Name and Title

Dr. Lawrence Band
University of North Carolina
Chapel Hill, NC

Formerly at:
University of Toronto
Department of Geography
Toronto, Ontario

2.2 Title of Investigation

Simulation of Boreal Ecosystem Carbon and Water Budgets: Scaling from Local to Regional Extents

2.3 Contact Information

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3. Theory of Measurements

Throughfall is the amount of precipitation that falls through a tree canopy. Throughfall catch buckets were placed at random locations and beside each turf lysimeter in each nested sampling plot. In addition, four intensive throughfall plots were located with only throughfall catch buckets. In all plots, the catch buckets were placed so that the lip of the bucket was just above the level of the live moss layer. Throughfall was measured using the same protocol that was used for gross precipitation, with care taken to extract any litter in the buckets.

4. Equipment

4.1 Sensor/Instrument Description

Throughfall Catch Buckets -- Clear plastic buckets with an 11 cm diameter orifice, 10 cm diameter base, and 10 cm depth were used.

4.1.1 Collection Environment

None given.

4.1.2 Source/Platform
Throughfall Gauges -- Placed in the live moss surface layer flush with the live moss surface.

4.1.3 Source/Platform Mission Objectives
The objective was to measure daily changes in water storages or turf weights.

4.1.4 Key Variables
Throughfall Gauge -- Throughfall (the amount of precipitation that falls through the forest canopy to the ground).

4.1.5 Principles of Operation
The gauges were designed to hold an amount of water that fell through the canopy, which was weighed. The weights were used to determine the water equivalent depth.

4.1.6 Sensor/Instrument Measurement Geometry
All throughfall gauges were repositioned using a bubble level to ensure that they were upright.

4.1.7 Manufacturer of Sensor/Instrument
Gauges -- Darryl Carlysle Moses and Kira Dunham
(University of Toronto, Dept. of Geography)

Weigh Scales -- (2) MARS MS3000W Series

4.2 Calibration
The weigh scales were calibrated to within the manufacturer's specifications immediately before the measurement campaign and at the University of Toronto after the campaign. The effect of the weigh scales being off level was also tested, with no appreciable difference for tilt angles less than 20 degrees (which were defined by the first indent in the bubble level gauge used in the field).

4.2.1 Specifications
Weight Scales

Weight < 1 kg: accurate to +/- 0.1 g Weight > 1 kg: accurate to +/- 1.0 g

4.2.1.1 Tolerance
None given.

4.2.2 Frequency of Calibration
The weigh scales were calibrated to within the manufacturer's specifications immediately before the measurement campaign and at the University of Toronto after the campaign.

4.2.3 Other Calibration Information
None.

5. Data Acquisition Methods

Each gauge and lysimeter was placed at a randomly selected location in each stratified plot or in clearings in the case of throughfall gauges. The locations were not changed during the field campaign. Measurements were made at each plot for all gauges and lysimeters before moving to another plot. The measurements were made by weighing the amount of water in the gauge. These weights were converted to water depths based on the orifice area of the gauge.

6. Observations

6.1 Data Notes

None given.

6.2 Field Notes

None given.

7. Data Description

7.1 Spatial Characteristics

All 1996 measurement plots were located within 500 m of the SSA-OBS flux tower along a single transect leading radially outwards from the tower. The goal was to place the plots on a perceived wetness gradient while keeping them within the flux tower footprint. In addition, each plot was located so that it was separated from the others to characterize the typical spatial variability of surface hydrological processes. Unfortunately, no plot was located in a region dominated by Sphagnum bogs, so turf lysimeters with sphagnum were located in isolated sphagnum patches within 10 m of each plot.

The 1994 throughfall data were collected near Joey Lake and near the NSA-OBS tower.

7.1.1 Spatial Coverage

In 1996, seven plots were located along a transect in the vicinity of the SSA-OBS flux tower. The locations of the plot and of the actual measurements are given in the following figures. Each plot had five live turf lysimeters and five throughfall gauges (one throughfall gauge near each live turf lysimeter). In addition, two throughfall plots with over 20 throughfall gauges were located independently.

At the Joey Lake site in 1994, these data were collected at four different plots.

At the NSA-OBS site in 1994, the data were taken from two plots located near the flux tower. The plots were about 30 meters apart, about 10 m by 10 m square each. The samples within each plot were about 5 meters apart.

The approximate North American Datum of 1983 (NAD83) coordinates of the various plots are as follows:

			BOREAS Grid	
Site	Longitude	Latitude	X	Y
NSA (Joey Lake)	98.15026W	55.46676N	807.025	571.969
NSA-OBS (Flux Twr.)	98.48139W	55.88007N	778.216	613.516
SSA-OBS (Flux Twr.)	105.11779W	53.98717N	385.012	348.646

7.1.2 Spatial Coverage Map

None.

7.1.3 Spatial Resolution

Each measurement site is located on the figures above.

Each throughfall gauge had an 11 cm diameter orifice, 10 cm diameter base, and 10 cm depth. The throughfall gauges may catch precipitation from a region larger than their orifices. The "fetch" of a throughfall or rain gauge depends on wind speed, precipitation intensity, and the cover over the gauge.

7.1.4 Projection

These plots are at point locations. A map projection is not applicable.

7.1.5 Grid Description
Not applicable.

7.2 Temporal Characteristics

7.2.1 Temporal Coverage
The data at the SSA-OBS were collected from July to August 1996 with some small gaps. The data at the NSA-OBS were collected from 23-Aug-1994 to 15-Sep-1994 with some gaps. The data at Joey Lake (near NSA) were collected from 24-Jun-1994 to 06-Sep-1994 with some gaps.

7.2.2 Temporal Coverage Map
None.

7.2.3 Temporal Resolution
In 1996, data were collected daily and after each rain event, where possible. After the time was recorded, data collection proceeded for 1.5 to 2 hours, in order to visit all of the gauges. Therefore, the actual data collection time is accurate to within 1.5 to 2.0 hours. The amount of precipitation recorded is the amount that fell since the gauge was last checked.

The temporal resolution of the 1994 data is assumed to be similar to that of the 1996 data.

7.3 Data Characteristics

7.3.1 Parameter/Variable
The parameters contained in the data files on the CD-ROM are:

Column Name
SITE_NAME
SUB_SITE
DATE_OBS
TIME_OBS
PLOT_ID
GAUGE_ID
THROUGHFALL
CRTFCN_CODE
REVISION_DATE

7.3.2 Variable Description/Definition
The descriptions of the parameters contained in the data files on the CD-ROM are:

Column Name	Description
SITE_NAME	The identifier assigned to the site by BOREAS, in the format SSS-TTT-CCCCC, where SSS identifies the portion of the study area: NSA, SSA, REG, TRN, and TTT identifies the cover type for the site, 999 if unknown, and CCCCC is the identifier for site, exactly what it means will vary with site type.
SUB_SITE	The identifier assigned to the sub-site by BOREAS, in the format GGGGG-IIIII, where GGGGG is the group associated with the sub-site instrument, e.g. HYD06 or STAFF, and IIIII is the identifier for sub-site, often this will refer to

	an instrument.
DATE_OBS	The date on which the data were collected.
TIME_OBS	The Greenwich Mean Time (GMT) when the data were collected.
PLOT_ID	The identifier for the plot from which the measurement came.

The 'P' plot indicates that throughfall was measured in an area that was relatively clear of trees. 'AVG' indicates that the throughfall value is an average.

GAUGE_ID	The identifier for the gauge from which the measurement came.

'AVG' indicates that the throughfall value is an average.

THROUGHFALL	The equivalent depth of water that fell through the canopy.
CRTFCN_CODE	The BOREAS certification level of the data. Examples are CPI (Checked by PI), CGR (Certified by Group), PRE (Preliminary), and CPI-??? (CPI but questionable).
REVISION_DATE	The most recent date when the information in the referenced data base table record was revised.

Note: In the 1994 and 1996 data, the PLOT_IDs and the GAUGE_IDs appear to be switched. For example, in 1994 GAUGE_IDs are listed as A, B, C, etc. and PLOT_IDs are listed as T1, T2, T3, etc. The opposite is true in the 1996 data set. These original designations were kept in order to be consistent with the original data. These designation simply serve to identify a unique measurement location. The plots and gauges from 1994 do not correspond to the same locations or measuring devices in 1996.

7.3.3 Unit of Measurement

The measurement units for the parameters contained in the data files on the CD-ROM are:

Column Name	Units
SITE_NAME	[none]
SUB_SITE	[none]
DATE_OBS	[DD-MON-YY]
TIME_OBS	[HHMM GMT]
PLOT_ID	[none]
GAUGE_ID	[none]
THROUGHFALL	[millimeters]
CRTFCN_CODE	[none]
REVISION_DATE	[DD-MON-YY]

7.3.4 Data Source

The sources of the parameter values contained in the data files on the CD-ROM are:

Column Name	Data Source
SITE_NAME	[Assigned by BORIS.]
SUB_SITE	[Assigned by BORIS.]
DATE_OBS	[Provided by Investigator.]
TIME_OBS	[Provided by Investigator.]
PLOT_ID	[Supplied by Investigator.]
GAUGE_ID	[Supplied by Investigator.]
THROUGHFALL	[Supplied by Investigator.]
CRTFCN_CODE	[Assigned by BORIS.]
REVISION_DATE	[Assigned by BORIS.]

7.3.5 Data Range

The following table gives information about the parameter values found in the data files on the CD-ROM.

Column Name	Minimum Data Value	Maximum Data Value	Missng Data Value	Unrel Data Value	Below Detect Limit	Data Not Cllctd
SITE_NAME	NSA-9BS-HYD08	SSA-OBS-FLXTR	None	None	None	None
SUB_SITE	HYD08-TFL01	HYD08-TFL01	None	None	None	None
DATE_OBS	24-JUN-94	11-AUG-96	None	None	None	None
TIME_OBS	0	2330	None	None	None	None
PLOT_ID	1	P	None	None	None	None
GAUGE_ID	AVG	T9c	None	None	None	None
THROUGHFALL	-99.9	51.96	None	None	None	Blank
CRTFCN_CODE	CPI	PRE	None	None	None	None
REVISION_DATE	21-MAY-97	14-JUL-97	None	None	None	None

Minimum Data Value -- The minimum value found in the column.
Maximum Data Value -- The maximum value found in the column.
Missng Data Value -- The value that indicates missing data. This is used to indicate that an attempt was made to determine the parameter value, but the attempt was unsuccessful.
Unrel Data Value -- The value that indicates unreliable data. This is used to indicate an attempt was made to determine the parameter value, but the value was deemed to be unreliable by the analysis personnel.
Below Detect Limit -- The value that indicates parameter values below the instruments detection limits. This is used to indicate that an attempt was made to determine the parameter value, but the analysis personnel determined that the parameter value was below the detection limit of the instrumentation.
Data Not Cllctd -- This value indicates that no attempt was made to determine the parameter value. This usually indicates that BORIS combined several similar but not identical data sets into the same data base table but this particular science team did not measure that parameter.

```
Blank -- Indicates that blank spaces are used to denote that type of value.
N/A   -- Indicates that the value is not applicable to the respective column.
None  -- Indicates that no values of that sort were found in the column.
------------------------------------------------------------------------------
```

7.4 Sample Data Record

The following are wrapped versions of data record from a sample data file on the CD-ROM.

```
SITE_NAME,SUB_SITE,DATE_OBS,TIME_OBS,PLOT_ID,GAUGE_ID,THROUGHFALL,CRTFCN_CODE,
REVISION_DATE
'NSA-9BS-HYD08','HYD08-TFL01',24-JUN-94,1800,'10','T10b',.31,'CPI',14-JUL-97
'NSA-9BS-HYD08','HYD08-TFL01',24-JUN-94,1800,'10','T10a',.94,'CPI',14-JUL-97
```

8. Data Organization

8.1 Data Granularity

The smallest amount of data that can be ordered from this data set is all of the throughfall data for a given site.

8.2 Data Format(s)

The Compact Disk-Read-Only Memory (CD-ROM) files contain American Standard Code for Information Interchange (ASCII) numerical and character fields of varying length separated by commas. The character fields are enclosed with single apostrophe marks. There are no spaces between the fields.

Each data file on the CD-ROM has four header lines of Hyper-Text Markup Language (HTML) code at the top. When viewed with a Web browser, this code displays header information (data set title, location, date, acknowledgments, etc.) and a series of HTML links to associated data files and related data sets. Line 5 of each data file is a list of the column names, and line 6 and following lines contain the actual data.

9. Data Manipulations

9.1 Formulae

See Section 9.1.1.

9.1.1 Derivation Techniques and Algorithms

The computation of water equivalent depth for throughfall gauges was performed using:

$$d\ (mm) = 1000\ (mm/m) * mass\_water(g) / (\ 1000 kg/m^3 * area\_gauge\_bottom(m^2)\ )$$

9.2 Data Processing Sequence

9.2.1 Processing Steps

- Set up necessary equipment.
- Performed daily weighings and emptied weighed gauges.
- Performed the necessary data manipulations.
- Added the necessary column headings.
- Transferred the information to the BOREAS Information System (BORIS).
- Loaded the data into the relational data base (done by BORIS staff).

9.2.2 Processing Changes
None given.

9.3 Calculations

9.3.1 Special Corrections/Adjustments
None.

9.3.2 Calculated Variables
See Section 9.1.1.

9.4 Graphs and Plots
None given.

10. Errors

10.1 Sources of Error

Quantifiable Errors

- Location errors - The plots were located with reference to the flux tower using dead reckoning. Errors on the order of +/-10 m can be expected for Figure 1 (location of plot origins) and +/- 0.1 m for Figure 2 (location of measurement sites within plots).
- Dimensional measurements - Measurements of radii, length, and width dimensions were made using a metric hand ruler. An error of +/-0.5 mm in precision is possible. This will result in negligible errors in computed surface areas of catch gauges or turf trays.
- Throughfall gauge weighing error - Tests were performed to detect the weight of water drops present on the sides of throughfall gauges. These weights were not measurable. The average weight of all throughfall gauges was used to compute the net weight of water in the gauge. The error in using the average weight is less than +/- 0.1 g and can be considered negligible.
- Weigh scale errors - The weigh scale errors assuming no contamination of the weighing surface (e.g., water drops on it) are given by the manufacturer as a precision error of +/- 0.1 g for weights less than 1,000 g and +/- 1.0 g for weights greater than 1,000 g.

Unquantifiable Errors

Throughfall Gauges

- Splashing of drops outside the gauge. This error suggests a negative accuracy error for throughfall gauges. However, given that splash is larger for larger storms (the water level in the container is higher and the drop size and velocity is likely higher) the accuracy bias should be small relative to the measured value.
- Lack of leveling because of wind or animal disturbance. Gauges that were substantially tilted were recorded but flagged and have not been included in the submitted data set.
- Drip not completed at observation time. It is possible that the drip process had not completed after the observation, especially for nighttime rains. No attempt was made to reconcile this possible negative accuracy error; however, substantial drip would be recorded in the subsequent measurement.

Gross Precipitation Gauges

- Errors caused by wind turbulence around the gauge, evaporation from the collector funnel or condensation on the funnel are possible. It is likely that precipitation is underestimated because of evaporation from the funnel.

10.2 Quality Assessment

10.2.1 Data Validation by Source

These data are very preliminary. General trends in the data are reliable; however, individual measurements may be completely in error.

10.2.2 Confidence Level/Accuracy Judgment

Mean values or plots and gross precipitation accuracy is estimated to be approximately 2 out of 5, individual measurements at 1 out of 5.

10.2.3 Measurement Error for Parameters

Estimates of errors of each measurement variable are given below.

- Time: +/- 2 hours
- Throughfall: The accuracy of the throughfall measurements is thought to be approximately 5%. The precision of each measurement is directly related to the precision of the scale that weighed the gauge.

10.2.4 Additional Quality Assessments

Data quality assessment is ongoing by the investigator.

10.2.5 Data Verification by Data Center

The data were loaded into the relational data base and checked to ensure that the values were loaded correctly.

11. Notes

11.1 Limitations of the Data

Isolated data points may be in complete error because of improper recording or reformatting during documentation. Revision of data is continuing.

11.2 Known Problems with the Data

None given.

11.3 Usage Guidance

Moss water fluxes are conservative; any strong jumps in time series should be flagged as potential measurement or recording errors unless explained by commensurate inputs.

11.4 Other Relevant Information

None.

12. Application of the Data Set

The HYD-08 data sets can be used for:

- Quantifying rough canopy interception rates for given storm size at the SSA-OBS site.
- Quantifying daily moisture fluxes in moss layers.
- Possibly inferring relationships between stand parameters and measured fluxes.
- Parameterizing flux models (especially hydrological models at stand to local scale).

13. Future Modifications and Plans

Data quality assessment is continuing by the investigators.

14. Software

14.1 Software Description

Not applicable.

14.2 Software Access

Not applicable.

15. Data Access

The HYD-08 throughfall data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

15.1 Contact Information

For BOREAS data and documentation please contact:

ORNL DAAC User Services
Oak Ridge National Laboratory
P.O. Box 2008 MS-6407
Oak Ridge, TN 37831-6407
Phone: (423) 241-3952
Fax: (423) 574-4665
E-mail: ornldaac@ornl.gov or ornl@eos.nasa.gov

15.2 Data Center Identification

Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) for Biogeochemical Dynamics http://www-eosdis.ornl.gov/.

15.3 Procedures for Obtaining Data

Users may obtain data directly through the ORNL DAAC online search and order system [http://www-eosdis.ornl.gov/] and the anonymous FTP site [ftp://www-eosdis.ornl.gov/data/] or by contacting User Services by electronic mail, telephone, fax, letter, or personal visit using the contact information in Section 15.1.

15.4 Data Center Status/Plans

The ORNL DAAC is the primary source for BOREAS field measurement, image, GIS, and hardcopy data products. The BOREAS CD-ROM and data referenced or listed in inventories on the CD-ROM are available from the ORNL DAAC.

16. Output Products and Availability

16.1 Tape Products
None.

16.2 Film Products
None.

16.3 Other Products
These data are available on the BOREAS CD-ROM series.

17. References

17.1 Platform/Sensor/Instrument/Data Processing Documentation
None.

17.2 Journal Articles and Study Reports
Haddeland, I. and D.P. Lettenmaier. 1995. Hydrologic Modeling of Boreal Forest Ecosystems. Water Resources Series Technical Report No. 143. University of Washington, 123 pp.

Newcomer, J., D. Landis, S. Conrad, S. Curd, K. Huemmrich, D. Knapp, A. Morrell, J. Nickeson, A. Papagno, D. Rinker, R. Strub, T. Twine, F. Hall, and P. Sellers, eds. 2000. Collected Data of The Boreal Ecosystem-Atmosphere Study. NASA. CD-ROM.

Price, A.G., K. Dunham, T. Carleton, and L.E. Band. 1997. Variability of water fluxes through the Black Spruce (Picea Mariana) canopy and Feather Moss (Pleurozium Schreberi) carpet in the Boreal Forest of Northern Manitoba. Journal of Hydrology, 196, 310-323.

Sellers, P. and F. Hall. 1994. Boreal Ecosystem-Atmosphere Study: Experiment Plan. Version 1994-3.0, NASA BOREAS Report (EXPLAN 94).

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Sellers, P., F. Hall, H. Margolis, B. Kelly, D. Baldocchi, G. den Hartog, J. Cihlar, M.G. Ryan, B. Goodison, P. Crill, K.J. Ranson, D. Lettenmaier, and D.E. Wickland. 1995. The boreal ecosystem-atmosphere study (BOREAS): an overview and early results from the 1994 field year. Bulletin of the American Meteorological Society. 76(9):1549-1577.

Sellers, P.J., F.G. Hall, R.D. Kelly, A. Black, D. Baldocchi, J. Berry, M. Ryan, K.J. Ranson, P.M. Crill, D.P. Lettenmaier, H. Margolis, J. Cihlar, J. Newcomer, D. Fitzjarrald, P.G. Jarvis, S.T. Gower, D. Halliwell, D. Williams, B. Goodison, D.E. Wickland, and F.E. Guertin. 1997. BOREAS in 1997: Experiment Overview, Scientific Results and Future Directions. Journal of Geophysical Research 102(D24): 28,731-28,770.

17.3 Archive/DBMS Usage Documentation
None.

18. Glossary of Terms

None given.

19. List of Acronyms

```
ASCII   - American Standard Code for Information Interchange
BOREAS  - BOReal Ecosystem-Atmosphere Study
BORIS   - BOREAS Information System
CD-ROM  - Compact Disk-Read-Only Memory
DAAC    - Distributed Active Archive Center
EOS     - Earth Observing System
EOSDIS  - EOS Data and Information System
FFC-T   - Focused Field Campaign - Thaw
GIS     - Geographic Information System
GMT     - Greenwich Mean Time
GSFC    - Goddard Space Flight Center
HTML    - Hyper-Text Markup Language
HYD     - Hydrology
IFC     - Intensive Field Campaign
NAD83   - North American Datum of 1983
NASA    - National Aeronautics and Space Administration
NSA     - Northern Study Area
OBS     - Old Black Spruce
ORNL    - Oak Ridge National Laboratory
PANP    - Prince Albert National Park
SSA     - Southern Study Area
URL     - Uniform Resource Locator
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20. Document Information

20.1 Document Revision Date
Written: 20-Nov-1996
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20.2 Document Review Date(s)
BORIS Review: 24-Jul-1998
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20.3 Document ID

20.4 Citation

When using these data, please contact the principal investigator, Dr. Lawrence Band (see Section 2.1), before publishing results that are based on these data as well as citing relevant papers in Section 17.2.

If using data from the BOREAS CD-ROM series, also reference the data as:

Band, L., "Simulation of Boreal Ecosystem Carbon and Water Budgets: Scaling from Local to Regional Extents." In Collected Data of The Boreal Ecosystem-Atmosphere Study. Eds. J. Newcomer, D. Landis, S. Conrad, S. Curd, K. Huemmrich, D. Knapp, A. Morrell, J. Nickeson, A. Papagno, D. Rinker, R. Strub, T. Twine, F. Hall, and P. Sellers. CD-ROM. NASA, 2000.

Also, cite the BOREAS CD-ROM set as:

Newcomer, J., D. Landis, S. Conrad, S. Curd, K. Huemmrich, D. Knapp, A. Morrell, J. Nickeson, A. Papagno, D. Rinker, R. Strub, T. Twine, F. Hall, and P. Sellers, eds. Collected Data of The Boreal Ecosystem-Atmosphere Study. NASA. CD-ROM. NASA, 2000.

20.5 Document Curator

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The BOREAS HYD-8 team made measurements of surface hydrological processes at the SSA (1996) and NSA OBS (1994) Tower Flux sites, supporting its research into point hydrological processes and the spatial variation of these processes. These data were collected during the 1994 and 1996 field campaigns. Data collected may be useful in characterizing canopy interception, drip, throughfall, moss interception, drainage, evaporation, and capacity during the growing season at daily temporal resolution. This particular data set contains the measurements of throughfall, which is the amount of precipitation that fell through the canopy. A nested spatial sampling plan was implemented to determine spatial variations of the measured hydrological processes and ultimately the impact of these variations on modeled carbon and water budgets. These data are stored in ASCII text files.

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